PLENARY Abstracts
The Science of Consciousness 2025

PLENARY 1

PL-1

Assessing the Delta: LLMs & Unified Agency

Dr. Farhan Lakhany PhD
University of Nebraska Omaha, Omaha, NE, USA

Primary Topic Area - TSC Taxonomy
[06.09].....AI /robotics
Categories by Discipline
1.0 Philosophy

Abstract
Assessing the Delta – LLMs & Unified Agency In June 2022, Blake Lemoine, an engineer working on Google's LaMDA project—a type of Large Language Model (LLM) developed specifically for conversation and dialogue—claimed that LaMDA was sentient. Lemoine was subsequently fired, with Google asserting that his belief lacked evidence after consulting their internal team of ethicists and technologists. Nevertheless, the idea of sentient AI—a topic long explored in various TV shows and movies—has been gaining interest due to the rise of increasingly sophisticated LLMs. In this paper, I discuss what LLMs are and why they are prompting such discussions. First, I explain how LLMs work, what they can currently do, the reasons behind the buzz surrounding them, and their importance. Second, I articulate the notion of consciousness relevant to the current discussion. Third, I examine why many perceive LLMs as conscious or nearing consciousness by highlighting three features: (1) their generative capacity, (2) their conversational style, and (3) their flexibility in application. I discuss why these features give us the sense that they are conscious—namely, because they are abilities typically thought to be exclusive to humans and, in humans, are tied up with conscious states. I highlight the underlying premise – like effects have like causes qua consciousness – and explore various responses to this reasoning. I focus on one particular response: while this premise provides a prima facie reason for thinking that LLMs conscious, it is insufficient to conclude that they are, in fact, conscious. I then explore what features are missing that, if present, would

give us strong reasons to think LLMs are conscious. To do this, I turn to David Chalmers's paper titled "Could a Large Language Model be Conscious?" Chalmers lays important groundwork for investigating whether LLMs are conscious, articulating reasons for and against this possibility. He considers six features that LLMs lack, which, if present, might confer consciousness. One such feature is unified agency; according to Chalmers, being unified agents is arguably a necessary condition for LLMs to be conscious. My paper delves deeper into this feature by mapping out (1) what it means to be a unified agent, (2) the relevant aspects for the current discussion, (3) why unified agency should be understood as a necessary condition for consciousness, and (4) whether LLMs could become unified agents. I conclude by highlighting areas for further research and raising potential counterarguments. I believe that clarifying the nature of artificial intelligence and its potential for consciousness is an extremely important discussion. One view in ethics, and one that I am sympathetic to, is that a necessary condition for entrance into the moral community is sentience. Once in, we have duties towards those included. If LLMs are sentient, they would become part of this community, and our metaphysical discussions would have significant ethical implications. Thus, to better calibrate how we ought to act, we need to understand the nature of LLMs and whether they might one day be conscious.

Keywords

AI, Consciousness, LLMs, Qualia

Links to Research

https://www.athensjournals.gr/humanities/2023-10-1-4-Lakhany.pdf

https://static1.squarespace.com/static/659c94332bafeb1cfad5f9ca/t/65a17cd7b3432e2f88f26f07/1705082071408/The+Meta-Problem+%26+Acquaintance+%28Draft%29.pdf

My name is **Farhan Lakhany** and I am a philosopher of mind and philosopher of artificial intelligence at the University of Nebraska Omaha. My current work centers around introspection and how that intersects with difficulties surrounding the "Hard Problem of Consciousness" and whether LLMs can be conscious. I also have deep interests in the philosophy of psychology, philosophy of cognitive science, evolutionary biology and computer science more generally.

Program Session - PL-1

PLENARY 1

PL-1

Experimental Design and Testing of a Quantum Consciousness Algorithm for AI and Robotics Running on an Adiabatic Quantum Computer

Suzanne Gildert, PhD
Nirvanic AI, Vancouver, BC, Canada

Primary Topic Area - TSC Taxonomy
[04.14].....Quantum theories of consciousness
Categories by Discipline
4.0 Physical and Biological Sciences

Abstract
We introduce and explore experimentally the idea of a quantum conscious agent (QCA) - a decision-making system connected to a physical robot that receives perception information from sensors and takes actions via a motor system. Perception information and action options are put into a highly quantum mechanical state, which is then collapsed into classical information, resulting in an action choice informed via collapse of the wavefunction. The QCA is implemented as a multilayer quantum neural network on a quantum annealing processor. By gradually updating the coupling values (weights) in the network based on Hebbian learning, the system is given multiple shots at embodying “quantum free will”, and converges to a stable action choice, which is then acted out by the robot. We perform experiments and present preliminary data rigorously testing whether the quantum decisions made by the system deviate from random, suggesting that the quantum decision encodes a purposeful behavior via connection to a deeper universal process. If quantum consciousness theories are correct, we conjecture that even a small QCA demonstrating purposeful behavior in this way would be experiencing some amount of conscious awareness.

Keywords
Quantum Consciousness, Quantum Computing, AI, Decision Making, Quantum Agents, Quantum, Consciousness Technologies, Quantum Neural Networks, Universal Purpose, Quantum Agency, Panpsychism

Links to Research
https://www.suzannegildert.com/patents-publications
https://www.nirvanic.ai/what-is-quantum-consciousness

Suzanne Gildert is Founder and CEO of Nirvanic AI. Nirvanic's mission is to understand consciousness so we can build it in machines and enhance it in people. The company is starting with an exploration of quantum consciousness and quantum agency in robotics and AI. Suzanne also co-founded Sanctuary AI, leading it as its first CEO and later CTO, designing the cognitive architecture for the company's "Phoenix" general purpose humanoid robot system. Earlier, she founded Kindred AI in 2014, which was acquired by Ocado in 2020 for one third of a billion dollars ($339 million CAD). Suzanne also has deep expertise in quantum computing from her time at D-Wave Systems and has a Ph.D. in experimental physics from the University of Birmingham, UK. She holds 67 filed US patents in quantum technologies and AI. She is also a published digital artist and pioneered a technique for creating art using a quantum computer. More information is available at suzannegildert.com

Program Session PL-1

PLENARY 1

PL-1

"Dodecanogram: A Novel Instrument for Detecting Microtubule Resonance in Anesthetic States"

Anirban Bandyopadhyay
National Institute for Materials Science, Ibaraki, Tsukuba, Japan

Primary Topic Area - TSC Taxonomy
[02.12].....Quantum brain biology
Categories by Discipline
4.0 Physical and Biological Sciences

Abstract
The Dodecanogram (DDG) represents a novel advancement over traditional EEG technology by detecting megahertz frequency bursts from microtubule bundles

within neurons. Experiments at BMHRC, Bhopal, showed these bursts correlate with unconscious states in anesthetized subjects and vanish upon regaining consciousness. Through experiments conducted on 40 human subjects conducted at BMHRC, Bhopal, on human subjects under anesthesia, we observed unique megahertz burst patterns analogous to neuronal spike trains. Notably, these patterns correlated with microtubule activity deep inside a neuron and disappeared as subjects regained consciousness, following unique spatio-temporal dynamics on the scalp. We simulated the transmission of these signals through virtual brain models in CST, encompassing skin, connective tissues, bone, bridging veins, cerebrospinal fluid, meninges, cortex layers, and microtubule bundles. Maxwell's equations revealed these signals pass one-way from the microtubule bundle to the skin, even through noise, but not in reverse. This discovery suggests a potential marker for unconsciousness, offering insights into subconscious layers of mind and coma states.

Links to Research
Principal Researcher, Functional Chromophores Group, Nanomaterials Field, Research Center for Materials Nanoarchitectonics (MANA)

Anirban Bandyopadhyay is a Senior Scientist at the National Institute for Materials Science (NIMS), Tsukuba, Japan, in the advanced key technologies division, AKED. Ph.D. in Supramolecular Electronics worked in Kolkata, India, and Sheffield, UK. Post Ph.D. from 2005 to 2008 independent ICYS research fellow at the ICYS, NIMS, Japan, worked on the brain-like bio-processor building. He possesses a Master of Science in Condensed Matter Physics, Computer, Numerical Analysis, and Astrophysics from North Bengal University and a Doctor of Philosophy in Physics from Jadavpur University. Anirban received his PhD from the Indian Association for the Cultivation of Science (IACS), Kolkata 2004-2005, where he worked on supramolecular electronics and multi-level switching. Bandyopadhyay has developed a resonance chain based complete human brain model that is fundamentally different than Turing tape essentially developing an alternate human brain map where filling gaps in the resonance chain is the key.

In 2008, he joined as a permanent scientist at NIMS, working on the cavity resonator model of the human brain and design-synthesis of brain-like organic jelly, microtubule inspired fourth circuit element and magnetic vortex, quantum cloaking and built dodecanion, icosanion geometric algebra. From 2013 to 2014 he was a visiting scientist at the Massachusetts Institute of Technology (MIT), USA. Received Hitachi Science and Technology award 2010, Inamori Foundation award 2011-2012,

Kurata Foundation Award, Inamori Foundation Fellow (2011-), and Sewa Society international member, Japan, SSI gold medal etc. Anirban has developed a unique quantum music measurement machine and experiments on DNA proteins, microtubules, neurons, molecular machines, cancer. Anirban Bandyopadhyay has also developed a new frequency fractal model. His group has designed and synthesized several forms of organic brain jelly that learns, programs and solves problems by itself for futuristic robots during as well as several software simulators that write complex codes by themselves.

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Program Session PL-1

PLENARY 2

PL-2

From Kolmogorov Theory to Computational Modeling and Brain Stimulation

Giulio Ruffini PhD
CEO, StarLab, Barcelona, BCN, Spain. CSO, Neuroelectrics, Barcelona, BCN, Spain

Primary Topic Area - TSC Taxonomy
[02.16].....Brain stimulation techniques
Categories by Discipline
2.0 Neuroscience

Abstract
From Kolmogorov Theory to Computational Modeling and Brain Stimulation The next frontier in brain stimulation—and neuromodulation technologies like multichannel transcranial electrical stimulation (tES), transcranial magnetic stimulation (TMS), and focused ultrasound (FUS)—demands robust computational models of the brain. These models must address fundamental questions: Where do we stimulate? How? Which network dynamics can we harness for therapeutic or enhancement purposes? Such insights are critically important in neurological disorders (e.g., epilepsy) and are especially pivotal in psychiatry, where many disorders can be understood as disruptions in “experience” itself. In this talk, I will first introduce the Kolmogorov Theory (KT) of consciousness, an algorithmic framework that describes how agents

form compressive, coarse-grained models that capture the regularities shaping subjective experience and guiding behavior. Drawing on group-theoretic invariances and parallels with Noether's theorem, KT reveals how hierarchical structures can naturally emerge in neural systems. It connects with the manifold hypothesis and suggests that biological (and artificial) neural networks compress data in ways that exploit the world's symmetries. On the road to computational neuropsychiatry, I will then illustrate how KT can help illuminate "first-person" disorders such as Major Depressive Disorder (MDD) by formalizing the notion of depression as "persistent low valence" and showing how dysfunctional valence, inaccurate world models, or suboptimal planning can emerge in the agent and affect one another. This agent-based perspective not only guides the search for potential etiological routes but also the development of computationally designed interventions—ranging from brain stimulation to psychedelics—to repair or recalibrate neural circuits. To translate this framework into a computational model, I will present our Laminar Neural Mass Model (LaNMM), which can represent interlocked fast and slow oscillations and capture intrinsic cross-frequency coupling (CFC) phenomena like Signal–Envelope (related to PAC) and Envelope–Envelope (or AAC) interactions, as well as the effects of brain stimulation. These coupling mechanisms realize a hierarchical "Comparator" function at the level of cortical columns, evaluating prediction errors and weighting uncertainties. Perturbations of this Comparator function can account for altered gamma oscillations in Alzheimer's disease, schizophrenia, and ASD, as well as the diminished top-down control observed under psychedelics, linking them to both cognition and subjective experience. Altogether, this synthesis of theoretical foundations and computational models provides a scaffold for advancing our understanding of neuropsychiatric disorders and their connections to neurophenomenology and the development of stimulation-based therapies. By pinpointing how neural circuits encode and compress key symmetries, we can design targeted interventions—via tES, TMS, FUS, or other modalities—that align with each individual's functional architecture, opening new avenues for personalized therapy and neurophenomenology.

Keywords
Algorithmic information theory, computational neuroscience, whole brain modeling

References

Ruffini 2017. An algorithmic information theory of consciousness

Ruffini et al. 2022. AIT foundations of structured experience.

Sanchez Todo et al. (2023). A physical neural mass model framework for the analysis of oscillatory generators from laminar electrophysiological recordings.

Ruffini et al. (2024). The Algorithmic Agent Perspective and Computational Neuropsychiatry: From Etiology to Advanced Therapy in Major Depressive Disorder.

Ruffini et al. (2025a). Structured Dynamics in the Algorithmic Agent.

Ruffini et al. (2025b). Cross-Frequency Coupling as a Neural Substrate for Prediction Error Evaluation: A Laminar Neural Mass Modeling Approach (in prep)

Dr. Giulio Ruffini, with a background in physics, founded Starlab in 2000, later founding Neuroelectrics in 2011. His pioneering work includes brain stimulation technology and brain-to-brain communication research. He is currently developing whole-brain modeling methods for brain stimulation in the ERC Galvani project and the FET Pathfinder Neurotwin project.

CEO of Starlab (http://starlab.es) and President of Neuroelectrics (http://neuroelectrics.com).

Previously, he has been a researcher at UC Davis and Los Alamos National Laboratory (both as a graduate research student), and a post-doc at the Catalan Institute for Space Studies (IEEC, Barcelona, Spain).

Program Session - PL-2

PLENARY 2

PL-2

From States to Traits: How Noninvasive Neuromodulation with Mindfulness Training Can Help Shift Consciousness Toward Lasting Wellbeing

Joseph Sanguinetti PhD
University of Arizona, Tucson, AZ, USA

Primary Topic Area - TSC Taxonomy
[03.03].....Other sensory modalities

Categories by Discipline

3.0 Cognitive Science and Psychology

Abstract

For over a decade, our group has explored how transcranial ultrasound stimulation (TUS) can be used to map and modulate the neural substrates of consciousness and wellbeing. TUS is a powerful, noninvasive tool that enables safe, reversible modulation of deep brain structures with millimeter precision. At the SEMA Lab, we've investigated how targeting the Default Mode Network (DMN) with TUS can induce transient states of equanimity—a fundamental quality cultivated in contemplative practice. In this talk, I will describe our developing paradigm for using TUS to accelerate the acquisition of mindfulness-related skills and traits. By coupling TUS-induced equanimity states with structured mindfulness training, we aim to cultivate acceptance-based emotion regulation capacities that support the transition from short-term state changes to lasting, trait-level wellbeing. I will present findings from our DMN-focused studies, integration of TUS with mobile meditation platforms, and results from the world's first TUS-enhanced meditation retreat. Together, these efforts outline a novel approach for understanding and cultivating comprehensive wellbeing through the intersection of precision neuromodulation and contemplative practice.

Links to Research

Joseph L. Sanguinetti, John JB Allen, Erica Nicole, Brian Lord, Shinzen Young, SEMA Lab

https://semalab.arizona.edu/

https://www.jaysanguinetti.com/sema-lab

Program Session - PL-2

PLENARY 3

PL-3

Instantaneous Memory Accession via Quantum Geometrodynamic Networks

Mr. William D Brown MSc

The International Space Federation, Marnaz, Haute-Savoie, France

Primary Topic Area - TSC Taxonomy

[04.09].....Biophysics and coherence

Categories by Discipline

4.0 Physical and Biological Sciences

Abstract

The biological basis of memory storage and retrieval has conventionally been understood through computational frameworks based on binary encoding. Here we present a novel mechanism for memory processes based on quantum geometrodynamics in biomolecular electrodynamics, where the discrete structure of spacetime as a quantum entangled network underlies physical processes of temporal-spatial coupling in biological systems. This coupling occurs through collective quantum coherence of interacting dipole resonators, which has a geometrodynamic network architecture of spacetime coordinates connected via Einstein-Rosen bridge topologies, where information is superficially encoded in the quantum entangled network of voxel oscillators but is fundamentally accessible acausally via the continuous multiply connected spacetime geometry. The mechanism is demonstrated through theoretical modeling of dipole oscillator coupling in benzene ring structures throughout subcellular systems, including microtubules and DNA polymers. We find this characteristic coupling accurately predicts observed quantum coherent states in biological macromolecules and enables hybrid analog-digital information processing. These findings describe a fundamentally new paradigm for biological memory storage and retrieval that does not rely on classical computational encoding but rather on direct spacetime geometric information accession, which is effectively quasi-instantaneous or acausal and hence fundamentally non-computational. This suggests that biological memory systems may be more sophisticated and fundamentally different than previously understood, with significant implications for our understanding of consciousness, memory, time and the development of novel computing architectures. The proposed mechanism is supported by existing empirical observations and offers testable predictions for future experimental verification.

Keywords
Quantum Biology, Quantum Coherence, Quantum Entanglement, Quantum Geometrodynamics, Quantum Electrodynamics, Microtubules, Memory, Quantum Computation, Retrocausality, Nonlocality
Links to Research
https://www.novosciences.org/research
https://spacefed.com/author/williambrown/

William Brown is a biophysicist with a background in molecular biology, molecular genetics, and physics. He obtained his Master's degree in applied recombinant DNA technology from New York University and performed graduate research at the University of Hawaii on epigenetics, neurogenesis, and brain cytoarchitectonics. He currently holds the position of biophysicist at the International Space Federation, where he performs research to elucidate foundational principles in the biophysics of the living system, with applications from life-extension technologies to consciousness. He presents lectures, talks, and Q&A forums to teach his syncretic approach of a comprehensive unified understanding of nature.

Program Session PL-3

PLENARY 3

PL-3

Qualia, Violation of Conservation Laws, and the Quanta of Pan-Psychism

Avshalom C Elitzur
Chapman University, Professor, Orange, CA, USA

Primary Topic Area - TSC Taxonomy
[01.08].....The "hard problem" and the explanatory gap

Categories by Discipline
4.0 Physical and Biological Sciences

Abstract
Qualia, the fundamental elements of subjective experience, cannot be inferred from brain dynamics, just as they are unrelated to any physical process. Consequently, they must be devoid of any causal effect, as such involvement is bound to violate energy and momentum conservation laws. Qualia can therefore exist only as mere

epiphenomena or parallel aspects of the physical world. Why, then, do many humans express bafflement about the apparently non-physical nature of their qualia? I show that all attempts to explain away this bafflement fail miserably. Ergo, it is qualia per se, by their very non-physical essence, that interfere with the brain's operation. Violation of conservation laws is therefore inevitable. I then speculate that every quantum of matter/energy and spacetime has a hidden "individual" property which is unique to that quantum alone, hence cannot be abstracted. This is in contrast to physical properties like size, charge, spin, etc., which are generic. In ordinary inanimate interactions, the individual properties give rise to mere quantum randomness. But in a stable system that operating on itself, a collective individuality can emerge and grow in magnitude to the level of coherent causal efficacy. The organism then asserts that there is a unique quality to each percept within it, which cannot be communicated or abstracted. These are the qualia. I conclude with some novel developments in the Two State-Vector Formalism of QM that may illuminate these questions.

Keywords
the hard problem, qualia, conservation laws, pan-psychism, quantum mechanics

Program Session PL-3

PLENARY 4

PL-4

Old theory, new evidence: microtubules are the biological substrate of quantum consciousness

Mike Wiest PhD
Wellesley College, Associate Professor Wellesley, MA, USA

Primary Topic Area - TSC Taxonomy
[02.10].....Anesthesia

Categories by Discipline
2.0 Neuroscience

Abstract
I review my recent experimental result strongly suggesting that the anesthetic gas isoflurane acts on microtubules to cause unconsciousness in rats. When combined with other old and new evidence—including direct biophysical evidence in living

neurons and conscious humans—my result supports the hypothesis that the physical substrate of consciousness is a quantum state of neuronal microtubules that is disrupted by inhalational anesthetics. After discussing future directions in anesthetic mechanism research, I turn to consider potential practical (behavioral, evolutionary) advantages of a quantum brain, and enormous theoretical advantages of a quantum consciousness model. In particular, I explain how the quantum model makes panpsychism viable as a solution to Chalmers' Hard Problem, by solving the phenomenal Binding (or Combination) Problem. Solving the Hard Problem in this way appears to leave us with an Epiphenomenalism Problem, meaning we cannot account for the evolution of useful conscious states if the conscious property of matter has no physical effects. Contrary to this "zombie" intuition, I propose a non-trivial solution to the Epiphenomenalism Problem, by recognizing a necessary connection between an essential property of conscious experiences and an objective property of their physical substrates. Finally, I point out that the Orchestrated Objective Reduction theory of Penrose and Hameroff embodies these advantages of a quantum model; and also accounts for non-algorithmic human understanding and the psychological arrow of time—which no other theory of consciousness does.

Keywords

anesthesia, quantum consciousness, quantum associative memory, Orch OR, microtubules, hard problem, binding problem, panpsychism, epiphenomenalism, active inference

Links to Research *https://www.eneuro.org/content/11/8/eneuro.0291-24.2024*

Mike Wiest graduated from high school in Kenya, East Africa, then returned to the United States to earn a BA in physics at Dartmouth College in 1991, and a PhD in high-energy theoretical physics at Michigan State University in 1998. Excited by the Orch OR quantum theory of consciousness, he spent the next 10 years learning neuroscience as a postdoc in computational neuroscience at Baylor College of Medicine and behavioral neurophysiology at Duke University. He is now an Associate Professor of Neuroscience at Wellesley College in Massachusetts, where he has been teaching and conducting chronic multi-electrode recording experiments in awake behaving rodents since 2008.

Program Session PL-4

PLENARY 4

PL-4

How consciousness may rely on brain cells acting collectively – evidence from psychedelic research on rats

Pär Halje PhD[1], Ivani Brys PhD[2,3], Sebastian Barrientos PhD[1], Per Petersson PhD[1]
[1]Lund University, Lund, -, Sweden. [2]Federal University of Vale do São Francisco, Petrolina, Pernambuco, Brazil. [3]Lund University, Lund, -, Brazil

Primary Topic Area - TSC Taxonomy

[05.04].....Psychedelic and other altered states of consciousness

Categories by Discipline

2.0 Neuroscience

Abstract

Psychedelic drugs are known for their ability to induce profound altered states of consciousness. Unlike other psychopharmacological compounds, such as stimulants or sedatives, which primarily modulate arousal and emotional valance, psychedelics fundamentally reshape perception, cognition and emotion. Since the function and distribution of the serotonin 2A receptor – the primary site of action of classic psychedelics – is well preserved across mammalian species, psychedelics offer a still largely unexplored opportunity to study consciousness in experimental animals using methodologies not feasible in human research. Downstream from the serotonin receptor, psychedelic drugs have been observed to affect the brain on several levels, including increased glutamatergic activity, altered functional connectivity and an aberrant increase in electrical high-frequency oscillations. To bridge these different levels of observation, we performed multi-structural, invasive electrophysiological recordings in freely behaving rats treated with psychedelics. Importantly, we compared the effects of classic, serotonergic psychedelics, such as LSD, with those of dissociative anesthetics like ketamine, which, despite acting on different receptors, also produce strong psychedelic effects at certain doses. Our findings revealed disparate modulations of neuronal firing rates for these two drug classes, suggesting that the general psychedelic state is not directly linked to changes in firing rates. However, local field potentials exhibited a shared pattern of synchronized high-frequency oscillations across multiple frontal brain structures. These oscillations were highly phase-locked across regions, with interregional delays of less than 1 ms. This hypersynchrony likely has major effects on the integration of information across neuronal systems, and we propose that it is a key contributor to changes in perception and cognition during psychedelic drug use.

Keywords
Psychedelics, Oscillations, Electrophysiology

Pär Halje holds an M.Sc. in Physics from Stockholm University and a Ph.D. in Cognitive Neuroscience from EPFL, Switzerland. Since 2010, he has been a researcher at Lund University, Sweden, in the Group of Integrative Neurophysiology. His lab specializes in chronic electrophysiological recordings in awake animals using multi-structure microwire electrodes. His research focuses on neural oscillations, particularly those induced by psychedelics, as well as their role in pathological states such as Parkinson's disease and psychosis.

Program Session PL-4

PLENARY 4

PL-4

Psilocybin and Prolonged Grief Disorder: Role of Subjective Experience on Outcomes

Dr Jennifer K Penberthy PhD
University of Virginia School of Medicine, Charlottesville, VA, USA

Primary Topic Area - TSC Taxonomy
[05.04].....Psychedelic and other altered states of consciousness
Categories by Discipline
3.0 Cognitive Science and Psychology

Abstract
Prolonged Grief Disorder (PGD) is a newly recognized mental health condition classified in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR). It is characterized by persistent and pervasive grief-related symptoms that continue for 12 months or more following the death of a loved one. Unlike normal grief, PGD is associated with profound emotional pain, identity disruption, loss of meaning, and functional impairment. Individuals with PGD experience persistent yearning and longing for the deceased, along with difficulty accepting the loss. PGD affects approximately 10% of bereaved individuals, with higher rates reported among those exposed to sudden or traumatic loss, such as deaths caused by COVID-19, mass-casualty events, and natural disasters. Vulnerable populations, including older adults and those with limited social support, are disproportionately affected. PGD is linked

to a range of adverse health outcomes, including increased risk of depression, anxiety, cardiovascular disease, substance misuse, and suicidal ideation. These outcomes underscore the urgent need for effective interventions for PGD, especially in the context of rising global grief due to the COVID-19 pandemic and other large-scale crises. This single-arm, open-label pilot study evaluated the feasibility, safety, and preliminary efficacy of psilocybin-assisted therapy for PGD. Participants underwent preparation sessions, a monitored administration of a 25 mg oral dose of psilocybin, and post-session integration support. Changes in grief, depression, and trauma-related symptoms were assessed using the Inventory of Complicated Grief (ICG), Patient Health Questionnaire-9 (PHQ-9), and Davidson Trauma Scale (DTS), respectively. Measures of subjective experience, including openness (IPIP NEO) and mystical experience (Mystical Experience Questionnaire; MEQ), were also collected. Functional magnetic resonance imaging (fMRI) was employed to explore neural correlates of psilocybin's effects on grief processing, focusing on changes in connectivity and activity in brain regions associated with emotion regulation and self-referential processing, including the default mode network (DMN), amygdala, insula, and medial prefrontal cortex (mPFC). Results demonstrated that psilocybin-assisted therapy was feasible and well-tolerated, with no serious adverse events reported. Clinically meaningful reductions in grief, depression, and trauma symptoms were observed at 1, 3, and 6-month follow-ups. Subjective reports revealed profound experiences of awe, connectedness, and a renewed sense of meaning, which were associated with increases in openness and psychological flexibility. Neuroimaging analyses exploring the impact in DMN connectivity and functional connectivity between the mPFC, amygdala, and insula are provided and discussed regarding the impact of psilocybin on grief-related cognition and emotional processing. These findings provide preliminary evidence for the efficacy of psilocybin-assisted therapy as a treatment for PGD. The observed changes in subjective experience and neurobiological markers underscore the potential role of altered states of consciousness in facilitating grief resolution. This study offers critical data to support the design of larger randomized controlled trials and suggests novel pathways for developing treatments for PGD and related mental health conditions.

Keywords

Psilocybin, Prolonged Grief Disorder, altered states of consciousness, fMRI, psychological flexibility, default mode network (DMN), awe, connectedness, mental health, neuroplasticity

Links to Research

https://med.virginia.edu/perceptual-studies/

Jennifer "Kim" Penberthy, Ph.D., ABPP is the Chester F. Carlson Professor of Psychiatry and Neurobehavioral Sciences at the University of Virginia School of Medicine. She also has a faculty appointment at the UVA Cancer Center. She is the immediate past president of the Society of Clinical Psychology. She has published extensively on psychotherapy, mindfulness, and resilience, and lectures internationally regarding her research. She also studies the mind-body relationship, exploring human consciousness as well as extraordinary human experiences, including the impact of such on human abilities and wellness. She is a founding member of the UVA Contemplative Sciences Center and is a Fellow of Humanism in Medicine at the University of Virginia. She is involved on an international level conducting research and consulting with the Center for Consciousness Research and the Scientific & Medical Network. Kim is also dedicated to promoting diversity and inclusion and exploring and honoring psychotherapeutic and contemplative practices from indigenous and native cultures. Her most recent book is co-authored with her daughter, Morgan, and is called "*Living Mindfully Across the Lifespan: An Intergenerational Guide,"* published by Routledge Taylor & Francis.

Program Session PL 4

PLENARY 5

PL-5

Evidence for Non-Local Consciousness and Extrasensory Perception

David del Rosario-Gilabert
Instituto de Neurociencia Avanzada de Barcelona (INAB), Barcelona, -, Spain

Primary Topic Area - TSC Taxonomy
[02.01].....Neural correlates of consciousness (general)

Categories by Discipline
3.0 Cognitive Science and Psychology

Abstract
Life is an intelligent, self-organizing process characterized by a continuous sequence of interdependent reactions, where each event is intrinsically linked to preceding and subsequent occurrences. Within this framework, human consciousness emerges as a complex and dynamic phenomenon, manifesting in people through perceptions, thoughts, and emotions. These phenomena contribute to an ongoing flux of conscious and unconscious interactions that define human experience. Scientific

inquiry has allowed us to observe and quantify these interactions, offering novel insights into phenomena that extend beyond direct sensory perception. Advances in cellular and wave mechanical interactions, communication between human and non-corporeal intelligences, and cognitive vision phenomena are measurable examples within contemporary neuroscience. This plenary session will critically analyze recent experiments performed at the Instituto de Neurociencia Avanzada de Barcelona (Spain), integrating interdisciplinary research to assess the feasibility of non-local information transfer and its implications for broadening our understanding of human cognition beyond established paradigms.

Keywords

thoughts, emotions, sonobiology, cognitive vision, non-corporeal intelligences

Links to Research

https://www.mdpi.com/2076-3417/14/20/9400

https://pubmed.ncbi.nlm.nih.gov/39848119/

David del Rosario is a researcher, science communicator, and director of the Institute of Advanced Neuroscience of Barcelona (INAB). He holds a Master's in Biomedical Engineering from the University of Barcelona and a PhD in Neurosciences from the University of Alicante. He combines a solid academic background with a passion for bridging science and everyday life. David's work focuses on research in cognitive neuroscience, particularly exploring human thought, emotions, and consciousness. He has published the best seller *El libro que tu cerebro no quiere leer*, which remained on Spain's top 10 non-fiction books list for weeks. His contributions to research and dissemination have earned him several prestigious awards, such as the National Telecommunications Award and the Extraordinary Award in Biomedical Engineering. David has shared his insights at conferences across Europe, North America, and South America, making complex scientific ideas accessible to diverse audiences. As the director of INAB, he continues to advance innovative approaches in neuroscience research and education.

Program Session PL-5

PLENARY 5

PL-5

IKS Approaches for holistic understanding of Mind, Brain, and Consciousness

Prof. Prof. Laxmidhar Behera

Indian Institute of Technology Mandi, Mandi, Himachal Pradesh, India

Primary Topic Area - TSC Taxonomy

[02.16].....Brain stimulation techniques

Categories by Discipline

2.0 Neuroscience

Abstract

The Indian Knowledge System (IKS) conceptualizes our existence as a superposition of three fundamental energies: pure semantic (consciousness), semantic (mind), and physical (brain). In other words, this framework provides a holistic understanding of cognition, perception, and neurophysiological processes. There is not much clarity as to how the perceptual world and physical world work in tandem. By introducing quantum-like entanglement in perception, we propose that self-propelled agents align based on the quantum expectation value of a perception operator, driving collective motion. We shall also reflect on human olfactory perception through the interplay of molecular vibration patterns of odorants and underlying EEG dynamics. Additionally, we explore how high-frequency probes in the megahertz range reveal intricate neural dynamics, particularly in children trained to exhibit near-normal visual perception despite being blindfolded. Building on these foundations, the discussion will conclude with IKS-based interventions designed to enhance cognitive function. In summary, we propose innovative approaches for improving perception, attention, and memory by integrating ancient wisdom with contemporary neuroscience and quantum-inspired models. This synthesis opens new possibilities for mental health, education, multi-agent coordination, and contemplative sciences through the lens of IKS.

Keywords - IKS, Models of Perception, Cognitive Enhancement

Prof Laxmidhar Behera joined as the Director of IIT Mandi on 19th January, 2022. Prior to this, he was working as the Poonam and Prabhu Goel Chair Professor in the Department of Electrical Engineering, IIT Kanpur, and simultaneously served as TCS affiliate faculty.

Program Session PL-5

PLENARY 6

PL-6

A Landscape of Consciousness: Toward a Taxonomy of Explanations and Implications

Robert Lawrence Kuhn PhD
Closer To Truth, New York, NY, USA

Primary Topic Area - TSC Taxonomy

[01.09].....Philosophical theories of consciousness

Categories by Discipline

1.0 Philosophy

Abstract

I seek an organizing framework for diverse explanations or theories of consciousness and to explore their impact on big questions. My central theses: (i) understanding consciousness at this point cannot be limited to selected ways of thinking or knowing, but should seek expansive yet rational diversity, and (ii) issues such as AI consciousness, virtual immortality, meaning/purpose/value, life after death, free will, etc., cannot be understood except in the light of particular theories of consciousness. I array diverse explanations or theories of consciousness on a roughly physicalist-to-nonphysicalist landscape of essences and mechanisms. Categories: Materialism Theories (philosophical, neurobiological, electromagnetic field, computational and informational, homeostatic and affective, embodied and enactive, relational, representational, language, phylogenetic evolution); Non-Reductive Physicalism; Quantum Theories; Integrated Information Theory; Panpsychisms; Monisms; Dualisms; Idealisms; Anomalous and Altered States Theories; Challenge Theories. There are many subcategories, especially for Materialism Theories. A Landscape of Consciousness, I suggest, offers perspective.

Keywords

Consciousness, Theories, Materialism, philosophical, neurobiological, electromagnetic field, computational, informational, homeostatic, affective, embodied, enactive, relational, representational, language, phylogenetic, Non-Reductive Physicalism, Quantum Theories, Integrated Information Theory, Panpsychism, Monism, Dualism, Idealisms, Anomalous cognition, Altered States Theories.

Links to Research

https://www.sciencedirect.com/science/article/pii/S0079610723001128?via%3Dihub

https://iai.tv/articles/seeing-the-consciousness-forest-for-the-trees-auid-2901

https://qspace.fqxi.org/news/165289/a-landscape-of-consciousness

https://scitechdaily.com/challenging-reality-a-scientist-maps-the-landscape-of-consciousness/

https://www.eurekalert.org/news-releases/1062716

Robert Lawrence Kuhn is the creator, writer, host, and executive producer of Closer To Truth, the long-running PBS/public television series and leading global resource on Cosmos (cosmology/physics, philosophy of science), Life (philosophy of biology), Mind (consciousness, brain/mind, philosophy of mind), and Meaning (theism/atheism/agnosticism, global philosophy of religion, critical thinking). Kuhn's comprehensive review article on theories of consciousness – "A Landscape of Consciousness: Toward a Taxonomy of Explanations and Implications" – is published in Progress in Biophysics and Molecular Biology (August 2024, pp. 28-169). In its review, IAI News says, "Kuhn has written perhaps the most comprehensive article on the landscape of theories of consciousness in recent memory." Kuhn has written or edited over 30 books, including The Mystery of Existence: Why is there Anything At All? (with John Leslie); Closer To Truth: Challenging Current Belief; Closer To Truth: Science, Meaning and the Future; The Library of Investment Banking; How China's Leaders Think (featuring President Xi Jinping); The Man Who Changed China: The Life and Legacy of Jiang Zemin(China's best-selling book in 2005 and in December 2022); and "The Origin and Significance of Zero: An Interdisciplinary Perspective" (with Peter Gobets). Kuhn is a recipient of the China Reform Friendship Medal. Kuhn is chairman of The Kuhn Foundation. He has a BA in Human Biology (Johns Hopkins), PhD in Anatomy/Brain Research (UCLA), and SM (MBA) in Management (MIT).

Program Session PL-6

PLENARY 6

PL - 6

Establishing standards for (realist) theories of consciousness/qualia: structural constraints from relationships among qualia

Naotsugu Tsuchiya PhD

Monash University, Melbourne, Victoria, Australia. ATR, Kyoto, Japan

Primary Topic Area - TSC Taxonomy

[01.05].....Qualia

Categories by Discipline

3.0 Cognitive Science and Psychology

Abstract

Upon accumulated evidence in the neural correlates of consciousness over the last 30 years, we have seen proliferation of theories of consciousness, rather than constraining them in any criterion. Due to the complexity of the problem, we might continue to see the list expand further into the future. One of the reasons for this expansion is due to too weak constraints imposed from binary, report-based tasks that have been dominant over the last 30 years of the neural correlates of consciousness approaches. Here we propose that structural constraints coming from empirical data will be much more powerful than the traditional approaches. Specifically, rather than mapping one single mental event to one single physical event, we should require many mental events AND their relationships to map with many physical events and their relationships in a coherent manner. Relational data about qualia, being established through the Qualia Structure project, offers such an opportunity. How can theories of consciousness explain why “red” feels the way it is? How does it compare to the way it feels about “sound”? What are the mechanisms that can potentially explain qualitative difference between any music and any painting? What are the potential answers from various theories as depicted in the "landscape of consciousness"? We will provide some promising perspectives from structural, relational theories of consciousness, such as Integrated Information Theory (IIT) of consciousness.

Keywords

Qualia, Qualia Structure, Relational approach, Structural theory, Integrated Information Theory

Links to Research

(1 Overview) The Qualia Structure Paradigm: towards a construction of a Qualia Periodic Table for the dissolution of the Hard Problem of Consciousness. Tsuchiya N. - osf.io/preprints/psyarxiv/492hu

(To appear as a book chapter for The Scientific Study of Consciousness: Experimental and Theoretical Approaches, edited by Umberto Olcese and Lucia Melloni)

(2 Empirical Research) "Is my "red" your "red"? Evaluating structural correspondences between color similarity judgments using unsupervised alignment" - Kawakita, G., Zeleznikow-Johnston, A., Takeda, K., Tsuchiya, N., and Oizumi, M. (2025) iScience https://doi.org/10.1016/j.isci.2025.112029

(3 Empirical developmental research) "Comparing color qualia structures through a novel similarity task in young children versus adults." Moriguchi, Y., Watanabe, R., Sakata, C., Zeleznikow-Johnston, A., Wang, J., Saji, N., and Tsuchiya, N. (2025). PNAS https://osf.io/preprints/psyarxiv/wdcu7_v3 For Demo https://youtube.com/shorts/-gPjL0T6Xiw

Dr. Naotsugu Tsuchiya was awarded a PhD at California Institute of Technology (Caltech) in 2006. Upon postdoctoral training at Caltech until 2010. In Jan 2012, he joined the School of Psychological Sciences at Monash University as an Associate Professor (Professor from 2020). His main research interest is to uncover the neuronal basis of consciousness. Recently, he focuses on the novel Qualia Structure approach on consciousness, which advocates to characterize the structure of qualia by measuring the similarity between qualia on a large scale, and to reveal their neural correlates and their causal information structure. The Qualia Structure project will further employ various research methods, including phenomenology, development, and constructivism, in order to estimate structures of qualia from perceptual to emotional domains. The outcome of this field is the creation of a new interdisciplinary research program that will have impacts to the general society, such as understanding the consciousness of others and the consciousness of animals and artificial intelligence.

Program Session PL-6

PLENARY 6

PL-6

Correlates of qualia in microtubule 'time crystal' dynamics

Stuart Hameroff MD[1,2], Tanusree Dutta[3], Anirban Bandyopadhyay[4]
[1]UArizona, Tucson, AZ, USA. [2]https://hameroff.arizona.edu/, Tucson, AZ, USA. [3]Indian Institute of Management Research, Ranchi, -, India. [4]International Center for Materials and Nanoarchitectronics (MANA); National Institute for Materials Science (NIMS), Tsukuba, -, Japan

Primary Topic Area - TSC Taxonomy

[04.02].....Quantum field approaches

Categories by Discipline

4.0 Physical and Biological Sciences

Abstract

Qualia are the basic instances of subjective conscious experience, but their origins and how they combine into full, rich consciousness are unknown. Conventional electroencephalography ('EEG') etc. have failed to reveal correlates of qualia. EEG detects brain activities ('waves') up to a few hundred hertz, but we now know coherent self-similar ('triplets-of-triplets') oscillation patterns occur in faster kilohertz, megahertz, gigahertz and terahertz frequencies ('DoDeconoGraphy, for 12 orders of frequency). These fractal dynamics derive from collective resonance oscillations of microtubules inside brain neurons, with megahertz in particular being easily detectable from scalp in humans. Megahertz triplets between 6 and 26 MHz appear to be functionally important, disappearing under general anesthesia. The fractal-like temporal behavior indicates microtubules act as 'time crystals', systems whose dynamics repeat at various scales, suggested in biology in the 1960s by Art Winfree, in physics in 2012 by Frank Wilczek, experimentally shown in physics recently, and in microtubules by Bandyopadhyay et al over the past 12 years. Time crystals are dynamical systems deconstructed into their component oscillators expressed as spherical clocks whose sizes are inversely related to frequency, and which may align, couple, interfere and resonate to give geometric expressions analogous to music. In a clinical study, human subject volunteers were asked to imagine specific qualia-like feelings. DDG frequencies taken under these emotional/qualia states were then analyzed as time crystals, combined/entangled and consolidated geometrically to map qualia on a hexagon-of-hexagon framework showing their relations. Microtubule time crystal behavior would be very useful for life and consciousness, supplying, quantum computing, unifying and temporally organizing, encoding

memory and transcending scales. It would require quantum coherence and entanglement among intraneuronal microtubules, consistent with the Orch OR theory of consciousness in which orchestrated objective quantum state reductions are instantaneous collapses of the quantum wavefunction (as Penrose fluctuations in fundamental spacetime geometry), like notes and chords across musical scales. Metaphors aside, Orch OR has more explanatory power, biological connection and experimental validation than all other theories of consciousness combined.

Links to Research

1. Dutta T, Bandyopadhyay A (2024) Emotion, Cognition and Silent Communication, Springer https://doi.org/10.1007/978-981-99-9334-5

2. Hameroff S (2022) A new paradigm needed in neuroscience, https://pubmed.ncbi.nlm.nih.gov/35782391/

3. Saxena et al (2022) Polyatomic time crystals of the brain, https://pubs.aip.org/aip/jap/article-abstract/132/19/194401/2837827/Polyatomic-time-crystals-of-the-brain-neuron?redirectedFrom=fulltext

4. Singh et al (2025) Megahertz window through scalp, skull and meninges, https://www.researchgate.net/publication/390314976_Meninges_act_as_a_gate_for_EEG_DDG_only_MHz_frequencies_can_reflect_from_14_layers_defining_consciousness_-_a_clinical_study

Stuart Hameroff Co-Founder, Director, Center for Consciousness Studies; Co-Chair, The Science of Consciousness; Professor Emeritus, Departments of Anesthesiology and Psychology, U of Arizona, Stuart Hameroff MD is a clinical anesthesiologist and researcher on how the brain produces consciousness, and how anesthetics act to erase it. In medical school in the early 1970s, Hameroff became interested in consciousness, and in protein structures called microtubules inside brain neurons which he came to believe processed information supporting consciousness. In the mid- 1990s he teamed with Sir Roger Penrose to develop the controversial 'Orch OR' theory in which consciousness derives from "orchestrated" ("Orch") microtubule quantum vibrations linked to processes in spacetime geometry, the fine scale structure of the universe, leading to "Penrose objective reduction" ("OR", hence "Orch OR"). And he has further proposed the 'microtubule quantum vibration' theory of anesthetic action. Hameroff organizes the well-known conference series 'The Science of Consciousness', has written or edited 5 books and over a hundred scientific articles, and appeared in films and various TV shows about consciousness. With University of Arizona colleagues Jay Sanguinetti, John JB Allen and Shinzen Young, Hameroff is developing transcranial ultrasound ('TUS') for treatment of mental and cognitive dysfunction (TUS may resonate endogenous megahertz vibrations in brain microtubules). Penrose-Hameroff Orch OR is one of a group of major theories of consciousness in the Templeton World Charity Foundation project 'Accelerating Research on Consciousness' and is currently being tested. experimentally. (Jan 2024 New Scientist Feature Cover on Quantum Consciousness, G. Musser). **Program Session PL-6**

PLENARY 7

PL-7

Can Gravity Collapse the Wavefunction? Bose-Einstein Condensates as a Testing Ground

Ivette Fuentes
University of Southampton, Southampton, United Kingdom

Primary Topic Area - TSC Taxonomy

[04.01].....Quantum physics, collapse and the measurement problem

Categories by Discipline

4.0 Physical and Biological Sciences

Abstract

The unification of quantum theory and general relativity remains one of the most significant open challenges in fundamental physics. A key obstacle is the lack of experimental data at regimes where quantum and relativistic effects intersect. Developing instruments sensitive to these scales could not only advance our understanding of quantum gravity, but also shed light on deep questions such as the nature of dark energy and dark matter. In this talk, I will explore how Bose-Einstein condensates (BECs) can serve as novel probes in this quest. A single BEC placed in a spatial superposition offers a platform to test whether gravity induces wavefunction collapse—a longstanding question in the foundations of quantum theory. Unlike solids traditionally used in such experiments (e.g. mirrors and nanobeads), BECs consist of unbound atoms, allowing for a richer variety of quantum states that may offer experimental advantages.

Links to Research

https://www.southampton.ac.uk/people/5y92lm/professor-ivette-fuentes-guridi#publications

Ivette Fuentes is a Professor of Physics at the School of Physics & Astronomy, University of Southampton. She is Fellow of the Emmy Network and Fellow by Special Election of Keble College, Oxford. Ivette obtained her PhD at Imperial College London (advisors: Peter L. Knight and Vlatko Vedral). Her postdoctoral experience includes a Glasstone Fellowship and Junior Research Fellowship (Mansfield College) at the University of Oxford and a position at the Perimeter Institute for Theoretical Physics in Waterloo, Canada. Ivette was Assistant Professor at UNAM México, Professor of Mathematical Physics at the School of Mathematical Sciences in Nottingham and

Professor of Theoretical Quantum Optics at the University of Vienna. Other distinctions include an Alexander von Humboldt Fellowship (Experienced Researchers) at the Technical University of Berlin and EPSRC Career Acceleration Fellowship, New Directions Award and Inspire Award. Her main research interest is understanding physics at scales where quantum theory and general relativity interplay.

Program Session PL-7

PLENARY 7

PL-7

Ontological Frameworks that Work

Thomas Brophy PhD
IONS, Novato, CA, USA

Primary Topic Area - TSC Taxonomy
[01.04].....Ontology of consciousness

Categories by Discipline
1.0 Philosophy

Abstract
The Institute of Noetic Sciences (IONS)' grand challenge is to reenchant the world through bringing conscious qualia and agency into a rigorously expanded scientific paradigm of how reality works. This challenge involves identifying ontological frameworks that can sustain (interpret and understand) the growing body of robust empirical experimental data that point to the existence of nonlocal conscious qualia and agency, and open up a new era of discovery in new ontological domains beyond the physical. This presentation explores the requirements of such a framework generally, and situates specifically the tri-domain ontology of reality proposed by Penrose (Shadows of the Mind 1994) including the Platonic domain together with the physical domain and the mental domain as three fundamental irreducible ontological domains of reality. Applications of such a framework to experimental and observational results are considered (new and many decades of past evidence of nonlocal consciousness effects; near-death, and reincarnational experiences; deep meditative experiences savikalpa samadhi; and the ontological foundations of the UAP phenomenon).

Keywords
Quantum, Collapse, Penrose, Plato, Platonic, Ontology, Qualia, Agency, Nonlocal.
Links to Research

https://noetic.org/science/publications/

Thomas G. Brophy, PhD, is President of the Institute of Noetic Sciences (IONS). He previously served as president of California Institute for Human Science (CIHS). His tenure as president of CIHS oversaw a many-year effort to achieve regional accreditation from the Western Association of Schools and Colleges, Colleges and Universities Commission (WSCUC) in 2021, for CIHS as a unique mind, body, spirit integral university. Earning a BA in physics from Colorado College, and MS and PhD degrees in physics from the University of Colorado (CU), Boulder, Thomas' academic and scientific appointments include: the CU Nuclear Physics Laboratory, the CU Laboratory for Atmospheric and Space Physics (LASP) where he work on NASA's Voyager and Cassini spacecraft projects, and an appointment as a National Science Foundation Exchange Scientist at the University of Tokyo Department of Earth and Planetary Physics and ISAS robotic space program, where he published pioneering work on computational solutions to the Boltzmann equation, the astrodynamical origins of planetary rings and interstellar comets. Thomas explored the fundamental science and ontology of consciousness and its cultural implications in his 1998 book The Mechanism Demands a Mysticism: An Exploration of Spirit, Matter, and Physics. His study of the archaeoastronomy of prehistoric Egypt, published in his co-authored books The Origin Map, and Black Genesis, has been cited as relevant to the study of extraterrestrial, or transhuman, intelligence.

Program Session. PL-7

PLENARY 7

PL-7

Sentiometry – Measuring Peri-somatic Modulation of Diffracted Light by Consciousness and Characterizing the Underlying Physicochemical Mechanisms

Dr Santosh A Helekar MD, PhD

Houston Methodist Research Institute, Houston, Texas, USA. Weill Cornell Medicine, New York, New York, USA

Primary Topic Area - TSC Taxonomy

[02.02].....Methodologies (fMRI, EEG etc.)

Categories by Discipline

2.0 Neuroscience

Abstract

Is the mechanism that gives rise to consciousness simply some manifestation of a neuronal or network level process that modern neuroscience has already uncovered? Or will this mechanism turn out to be an entirely new deeper subcellular physicochemical mechanism that is presently unknown or only hypothetical? We have recently discovered a new type of biophysical effect that suggests the latter possibility. This effect can be recorded in the peri-somatic space with a noninvasive, non-contact photoelectronic device called a Sentiometer (STM) developed in our laboratory. It involves a marked decrease in the magnitude of light wave phenomena such as interference and diffraction caused by proximity of the STM sensor module to the head or any other part of the body of a conscious human subject or a mouse. The source of light waves inside the sensor module is a low power laser light-emitting diode. We have designed and constructed 2 versions of STM producing either double slit interference patterns or single aperture beam diffraction. The peri-somatic sentiometric response (SR) to conscious subjects cannot be accounted for by known physical effects, such as body heat, humidity, electrostatic effects, electromagnetic interference, movement of air, and infrared or ultraweak photon emissions. It is substantially attenuated by general anesthesia, sedation and unconscious states produced by brain damage or dysfunction. Exposure of invertebrates, plants or decapitated heads of mice less than ~3 hours after death to the STM sensor module produces an inverted SR. An inverted response is also produced by certain polymeric materials containing 6-carbon rings such as polystyrene and carbon nanotubes when they interact with water. The amplitude of the polystyrene-water inverted response is reduced when deuterium oxide is

substituted for water. It is also modulated by a rapidly changing magnetic field and the direction of such modulation is dependent on the orientation of the magnetic axis relative to some structural feature of polystyrene. The latter observations suggest that the spins of delocalized electrons in polymeric 6-carbon ring structures and the interactions of these electrons with water molecules might play a role in mediating the sentiometric effect, and by extension, possibly, the mechanism that generates consciousness.

Keywords

Consciousness measurement, general anesthesia, disorders of consciousness, brain death, quantum biology, light intensity modulation, molecular mechanisms

Santosh Helekar is a neuroscientist at the Houston Methodist Research Institute (HMRI) in Houston, Texas, USA. He has a medical degree (M.B.B.S.) from the University of Bombay, India and a Ph.D. in Neuroscience from Baylor College of Medicine, Houston, Texas, USA. Presently, he is the Scientific Director of Translational Biomagnetics and Neurometry Program at HMRI and a Professor of Neuroscience Research in Psychiatry at Weill Cornell Medical College, New York, New York. His most recent scientific and technological contributions include the invention of three noninvasive devices with wide-ranging neuroscience applications. The first device called Transcranial Rotating Permanent Magnet Stimulator (TRPMS) is a neuromodulation cap that has shown promise in a pilot phase I/IIa clinical trial for the treatment of chronic ischemic stroke and is being tested now for the treatment of drug-resistant depression. The second device called the Oncomagnetic helmet is being used under FDA's expanded access program to treat end-stage recurrent glioblastoma patients and will shortly be investigated for safety and efficacy alongside standard of care treatment for the treatment of newly diagnosed glioblastoma in a pilot clinical trial. The third device called the Sentiometer was able to detect a previously unrecognized peri-somatic biophysical effect that is attenuated by general anesthesia and by unconsciousness due to brain damage or dysfunction. It is being tested in an ongoing pilot clinical study for safety and efficacy for continuously monitoring the level of consciousness of unresponsive unconscious or delirious patients in the intensive care unit. The Sentiometer appears to be sensitive to an electromagnetically modulated physicochemical process, possibly involving the interactions of delocalized electrons in aromatic organic polymers with water molecules. Consequently, it could provide a window into the fundamental subcellular mechanism that generates consciousness.

Program Session PL-7

PLENARY 8

PL-8

Scaling from Quantum Vacuum Fluctuations to the Brain

Nassim Haramein, William Brown MSc, Cyprien Guermonprez PhD, Olivier Alirol PhD
International Space Federation (ISF), Marnaz, Haute Savoie, France

Primary Topic Area - TSC Taxonomy

[04.02].....Quantum field approaches

Categories by Discipline

4.0 Physical and Biological Sciences

Abstract

The ground state of the electromagnetic field is characterized by constitutive energetic fluctuations due to zero-point energy of the quantum harmonic oscillators that compose the field, called quantum vacuum fluctuations. These constitutive oscillations of quantum vacuum energy have been shown to play a significant role in atomic processes, from being a source of the underlying stability of matter to light-matter interactions. It is also regarded to play significant roles at the confluence of astrophysics and quantum information theory with Unruh-Hawking radiation, which is conventionally thought to result in black hole thermalization, and at the cosmological scale with the Hubble Constant, which is related to the expansion rate of the universe. Here we identify a mechanism in which the ultra-high frequency oscillations of the electromagnetic quantum vacuum fluctuations couple across scales via a spring constant, k, representative of an angular momentum conservation from fine scale spacetime dynamics to the biological scale of molecules and cells. We find this characteristic coupling constant accurately predicts the vibrational frequencies empirically observed. We scale from the Planck scale to the biological scale, through carbon atoms to benzene ring aromatic hydrocarbon molecules, to the triplet-of-triplet frequencies measured in microtubules, and gamma oscillation of neurons, thus identifying the mechanism of coupling of quantum harmonic oscillators across scales. As such, vibrational energy transfer is described within a nested architecture of coupled oscillators, sourced in a Planck pulse frequency of coherent electromagnetic quantum vacuum fluctuations demonstrated utilizing correlation functions. These findings describe the role of quantum vacuum energy in coupling molecular oscillators and being the source of the non-classical non-trivial quantum states that have been experimentally observed in biological macromolecular networks. This suggests that these states are

more common and more robust than would be presumed in models without a driving source like the zero-point energy coupling we have computed. These findings open a door to new biophysical insights implying a significant role in dynamic quantum fluctuations at the biological scale.

Keywords
Quantum vacuum fluctuations Zero-point energy coupling Nested oscillator architecture Biophysical quantum coherence Scale coupling dynamics
Links to Research
https://spacefed.com/isf-research/

Nassim Haramein is a Swiss born, 35-year veteran physicist working on a complex problem in physics — Unification Theory (the unification of General Relativity and Quantum Mechanics). Haramein has researched fields of physics, mathematics, cosmology, quantum mechanics, biophysics, as well as cultural anthropology and archeology. These studies led to a unification theory published in scientific papers, and subsequent numerous patented inventions.

Haramein has worked in collaborative efforts with some renown physicists and currently holds a director of research position at the International Space Federation organization which includes doctors in physics from some of the most reputable physics universities in the world.

He has founded research organizations and successful corporations throughout the last two decades.

Program Session PL-8

PLENARY 8

PL-8

Self-operating mathematical universe, SOMU: Why do we need a non-physical reality to explain a physical system?

Anirban Bandyopadhyay
National Institute for Materials Science, Tsukuba, Ibaraki, Japan

Primary Topic Area - TSC Taxonomy

[01.09].....Philosophical theories of consciousness

Categories by Discipline

5.0 Experiential Approaches

Abstract

When we measure atomic scale systems and quantum properties emerge, we often think that the property is emergent from spatio-temporal dynamics. This is not true, there is an imaginary world where the properties arise. It is unfortunate that for nearly a century, scientists have put a significant effort into modeling observations with predictive spatiotemporal features, here we argue that a set of human subject experiments and our measurement of various biological systems show that a black box imaginary world needs to be unveiled. We need to understand and mathematically derive this imaginary or non-physical world. The black box needs to be explicitly understood. We will demonstrate why helical symmetry and dynamics of the density of primes are two fundamental features that could generate a mathematical universe framework, from which spatio-temporal worlds basic parameters could be derived.

Keywords

Brain signal measurement, cognitive experiment, human subject study

Program Session PL-8

PL-9

Cognition emerges from neural dynamics

Earl K. Miller

MIT, Dept of Brain and Cognitive Sciences, Picower Institute, Cambridge, MA, USA

Primary Topic Area - TSC Taxonomy

[02.13].....Brain networks, synchrony and scale

Categories by Discipline

2.0 Neuroscience

Abstract

Classic models likened brain function to neuron networks, like telegraph systems. Emerging evidence, however, suggests higher cognition relies on rhythmic oscillations or "brain waves" at the electric field level. This expands functionality, with "telegraph wires" also producing "radio waves" (electric fields) that rapidly spread

influence. These fields may facilitate large-scale organization, enabling executive control and energy- efficient analog computing.

Keywords
neuron networks, rhythmic oscillations, brain waves, electric fields, telegraph wires, radio waves, energy efficient analog computing

Earl Keith Miller is a cognitive neuroscientist whose research focuses on neural mechanisms of cognitive, or executive, control. Earl K. Miller is the Picower Professor of Neuroscience with the Picower Institute for Learning and Memory and the Department of Brain and Cognitive Sciences at Massachusetts Institute of Technology. He is the Chief Scientist and co-founder of SplitSage. Earl Miller received a Bachelor of Arts degree (summa cum laude, with honors) in psychology from Kent State University in 1985, Master of Arts degree in psychology and neuroscience from Princeton University in 1987, and a PhD in psychology and neuroscience from Princeton University in 1990. In 2020, Earl Miller was awarded an honorary doctorate (Doctor of Science, honoris causa) from Kent State U.

Program Session PL-9

PLENARY 9

PL-9

The dendritic decoupling hypothesis of anesthesia

Matthew Larkum
Humboldt Universität zu Berlin Institut für Biologie, Berlin, Charitéplatz, Germany

Primary Topic Area - TSC Taxonomy
[04.08].....Quantum brain biology

Categories by Discipline
4.0 Physical and Biological Sciences

Abstract
Despite almost two centuries of clinical use, how general anesthetics reversibly suppress consciousness remains elusive. In the 2022 TSC meeting, I presented the evidence that anesthetics disrupt the functional coupling between distal and proximal segments of cortical pyramidal neurons, suggesting this decoupling could underlie anesthesia (Suzuki & Larkum, 2020). We have previously shown that

perception is intimately associated with activating the apical dendrites of the large layer 5 pyramidal neurons that complete the thalamocortical loop (Larkum, 2013; Takahashi et al., 2016 & 2020). The disruption of signalling from along the apical dendrites of these neurons under anesthesia (and by metabotropic receptor blockers) therefore constitutes a candidate mechanism for loss of consciousness. In this presentation, I will show in vitro data confirming that metabotropic receptor activation strengthens dendro-somatic coupling, while anesthetics weaken it. Moreover, disrupting the microtubules extending through the apical shaft also reduces dendritic influence on the cell body. These findings strengthen the view that dendro-somatic coupling is central to cortical feedback and may be the key to understanding how anesthetics block conscious processing.

Program Session PL-9

PLENARY 9

PL-9

Neural Dynamics of the Primate Attention Network

Sabine Kastner MD, PhD
Princeton University, Princeton, NJ, USA

Primary Topic Area - TSC Taxonomy
[03.01].....Attention

Categories by Discipline
2.0 Neuroscience

Abstract
The selection of information from our cluttered sensory environments, often referred to as 'attention', is one of the most fundamental cognitive operations performed by the primate brain. In the visual domain, the selection process is thought to be mediated by a spatial mechanism – a 'spotlight' that can be flexibly shifted around the visual scene. In my lecture, I will provide an overview on its neural basis by discussing neuroimaging and intracranial electrophysiology studies in the human and monkey brain. Neuroimaging studies have shown that the spatial selection mechanism engages a large-scale network that consists of multiple nodes distributed across all major cortical lobes and includes also subcortical regions in the midbrain and thalamus. Electrophysiology studies have provided a rich understanding of the specific functions of each network node and their functional

interactions. Key findings reveal that (i) the cortical network is coordinated by a thalamic timekeeper in the pulvinar and (ii) processing in sensory cortex is modulated by feedback signals from a fronto-parietal control network. The fronto-parieto-pulvinar network is characterized by complex temporal dynamics that set up alternating attentional states, which emphasize either environmental sampling of information or shifting of spatial selection to a new location and can be measured as behavioral rhythms. Collectively, these studies in the adult brain set the stage for translational applications such as exploring the typical and atypical development of attention function and its deficits in neurological and psychiatric diseases.

Program Session PL-9

PLENARY 10

PL-10

Computational capacity of life in relation to the universe

Dr. Philip Kurian Ph.D.

Quantum Biology Laboratory, Howard University, Washington, DC, USA

Primary Topic Area - TSC Taxonomy

[04.10].....Origin and nature of life

Categories by Discipline

4.0 Physical and Biological Sciences

Abstract

Networks of tryptophan – an aromatic amino acid with strong fluorescent response – are ubiquitous in biological systems, forming diverse architectures in transmembrane proteins, cytoskeletal filaments, sub-neuronal elements, photoreceptor complexes like UVR8, virion capsids, and other cellular structures. We analyzed the cooperative effects induced by ultraviolet (UV) excitation of several biologically relevant tryptophan mega-networks, thus giving insight into novel mechanisms for cellular signalling and control. Our theoretical analysis in the single-excitation manifold predicted the formation of strongly superradiant states due to collective interactions among organized arrangements of up to more than 100,000 tryptophan UV-excited transition dipoles in microtubule architectures, which leads to an enhancement of the fluorescence quantum yield that is confirmed by our steady-state experiments [1]. Preliminary femtosecond UV transient absorption results indicated superradiant state lifetimes of no more than a few picoseconds, consistent with our predictions. We demonstrated the observed consequences of single-photon

superradiant behavior in the fluorescence quantum yield for hierarchically organized tubulin structures, which increases in different geometric regimes at thermal equilibrium before saturation – highlighting the effect's persistence in the presence of significant disorder. Contrary to conventional assumptions that quantum effects cannot survive in large biosystems at high temperatures, our numerical results [2] suggest that macropolymer lattices of tryptophan in actin filaments and amyloid fibrils exhibit increasingly observable and robust effects with increasing length, due to quantum coherent interactions in the single-photon limit. Superradiant enhancement and high quantum yield in neuroprotein polymers would thus play a crucial role in information processing in the brain, the development of neurodegenerative diseases such as Alzheimer's and related dementias, and a wide array of other pathologies characterized by anomalous protein aggregates. Our results motivated a revisiting of the computing limits of cytoskeletal and neuronal architectures [3], which are generally considered to signal via Hodgkin-Huxley action potentials (~millisecond) rather than via superradiant states in such tryptophan lattices (~picosecond). The latter would allow information-processing pulses or bursts at orders of magnitude faster speeds than exascale supercomputers, at significantly lower power consumptions, by operating within two orders of magnitude of the Margolus-Levitin quantum speed limit for UV-excited states. The robustness of superradiant states paired with subradiant states (~second) in these protein architectures thus offers a novel paradigm for understanding the role of large collectives of quantum emitters in warm, wet, and wiggly environments. REFERENCES [1] N.S. Babcock, G.M.-Cabrera, K.E. Oberhofer, M. Chergui, G.L. Celardo, and P. Kurian. Ultraviolet superradiance from mega-networks of tryptophan in biological architectures. Journal of Physical Chemistry B 128, 4035–4046 (2024). [2] H. Patwa, N.S. Babcock, and P. Kurian. Quantum-enhanced photoprotection in neuroprotein architectures emerges from collective light-matter interactions. Frontiers in Physics 12, 1387271 (2024). [3] P. Kurian. Computational capacity of life in relation to the universe. Science Advances 11, eadt4623 (2025).

Keywords

quantum biology, superradiance, subradiance, protein architectures, biological qubits, ultraviolet, tryptophan, quantum emitters, Margolus-Levitin speed limit, computational capacity of life, quantum computing, quantum information processing, origins of life, habitable zones, cosmology, observable universe

Links to Research

https://www.eurekalert.org/news-releases/1077836

https://www.science.org/doi/10.1126/sciadv.adt4623

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https://www.eurekalert.org/news-releases/1055890

https://www.frontiersin.org/journals/physics/articles/10.3389/fphy.2024.1387271/full

https://www.quantumbiolab.com/news.html

Dr. Philip Kurian is a theoretical physicist, (re)search(ing) scientist, and essayist, serving as principal investigator and founding director of the Quantum Biology Laboratory (https://quantumbiolab.com/) at Howard University. Beginning his career as a math teacher in North Philadelphia, he completed his doctorate in physics after a stint at NASA Goddard Space Flight Center. Dr. Kurian is now the recipient of fellowships, grants, and awards from the Alfred P. Sloan Foundation, U.S.-Italy Fulbright Commission, Guy Foundation Family Trust (UK), National Science Foundation, and the National Institutes of Health. The Quantum Biology Laboratory studies how collective and cooperative quantum behaviors can explain biological phenomena at the mesoscopic, organismal, and clinical scales, including in neurodegeneration, cancer, and human consciousness. His group's pioneering work on single-photon superradiance in eukaryotic protein filaments and neuron fibers has been featured by *Science*, *The Quantum Insider*, Oak Ridge Leadership Computing Facility, *SPIE Photonics Focus*, *Optica*, *Laser Focus World*, *BioPhotonics*, *Howard Magazine*, *TEDx*, and by prominent science channels including *Science News with Sabine* and *PBS Space Time*. Dr. Kurian is a Fellow of the UCSB Kavli Institute for Theoretical Physics, and a Simons Scholar and Senior Fellow at the UCLA Institute for Pure and Applied Mathematics. He was appointed to the chairing committee for the National Academies of Sciences, Engineering, and Medicine workshop on quantum-enabled sensing and imaging for biology. Dr. Kurian also serves as a scientific advisor to the "Science for Seminaries" program of the AAAS Dialogue on Science, Ethics, and Religion, which seeks to integrate frontier science questions into conversations among future theologians and clergy. His essays on science, human knowledge systems, and empire have appeared in various media outlets, including the *Los Angeles Review of Books*, *Granta*, and *Plough*. For more information, please visit https://profiles.howard.edu/philip-kurian. **Program Session PL-10**

PLENARY 10

PL-10

The Science of Quantum Biology and Its Implications for Consciousness

Prof. Dante S Lauretta Ph.D.
University of Arizona, Tucson, AZ, USA

Primary Topic Area - TSC Taxonomy
[04.10].....Origin and nature of life

Categories by Discipline
4.0 Physical and Biological Sciences

Abstract
Quantum biology is an emerging field exploring the role of quantum mechanical principles—coherence, entanglement, and superposition—in biological systems. While classical biochemistry has successfully explained many life processes, growing evidence suggests that quantum effects may play a nontrivial role in molecular and cellular functions, particularly in the brain. Understanding these quantum influences is essential for advancing our knowledge of consciousness, cognition, and the fundamental nature of life itself. Recent research indicates that quantum coherence in biomolecules may contribute to biological information processing. One area of focus is the cytoskeleton, particularly microtubules, which provide structural support in neurons and facilitate intracellular communication. Microtubules contain aromatic amino acids such as tryptophan, which exhibit unique quantum optical properties. Studies have suggested that superradiance, excitonic energy transfer, and quantum coherence in tryptophan networks could enable efficient energy transport and contribute to cellular signaling and cognitive function. Using high-resolution spectroscopy, Förster resonance energy transfer (FRET), and computational modeling, researchers are investigating whether these quantum processes provide an additional layer of biological information storage and processing beyond classical biochemistry. Another critical area of investigation is the quantum nature of anesthesia. Empirical evidence shows that anesthetic potency can vary depending on the nuclear spin of xenon isotopes, suggesting a potential quantum effect in neural activity suppression. This challenges conventional models of anesthesia, which assume purely biochemical interactions. Studies employing multi-electrode arrays, high-resolution NMR spectroscopy, and spin resonance techniques are examining how quantum coherence in neural proteins and lipid membranes might

influence consciousness states. These findings could lead to a deeper understanding of how quantum mechanics contributes to brain function and perception. The implications of quantum mechanics extend beyond individual cognition to biological evolution and the origins of life. A growing body of research suggests that quantum effects in nucleic acids and amino acids may have played a role in molecular self-organization and early evolutionary complexity. The indole ring of tryptophan, for instance, possesses quantum properties that may have facilitated non-classical information processing in prebiotic chemistry. Additionally, theoretical models incorporating quantum complexity theory propose that evolutionary processes could be driven by quantum information dynamics, accelerating biomolecular adaptation and functional diversity. From a technological perspective, the integration of quantum biology into applied science is opening new frontiers. Advances in quantum-enhanced biotechnologies, neuromorphic computing, and bio-inspired quantum sensors offer promising avenues for medical and environmental applications. By leveraging biomolecular quantum coherence, researchers are developing novel biosensors and computational architectures that could revolutionize fields such as neuroscience, pharmacology, and artificial intelligence. The convergence of quantum mechanics, molecular biology, and neuroscience represents a paradigm shift in how we understand life and consciousness. By moving beyond classical descriptions of biology and integrating quantum principles, researchers are uncovering new mechanisms of cognitive processing, novel insights into the origins of life, and revolutionary applications in technology. As experimental techniques advance, the science of quantum biology has the potential to reshape fundamental theories of consciousness and redefine our understanding of the living world.

Keywords
Quantum Biology, Coherence, Cytoskeleton, Complexity Theory, Evolution,

Dr. Dante S. Lauretta is a distinguished scientist known for his pioneering contributions to planetary science and astrobiology. As a Regents Professor at the University of Arizona, he leads groundbreaking research initiatives that explore the mysteries of our solar system and the origins of life. Dr. Lauretta is at the forefront of scientific exploration, and his work has made a profound impact on our understanding of the cosmos.

One of his most remarkable achievements is his leadership role in the NASA OSIRIS-REx asteroid sample return mission. Dr. Lauretta's vision and expertise guided this ambitious mission, which successfully collected samples from the asteroid Bennu and returned them to Earth. This achievement represents a significant milestone in

space exploration and offers invaluable insights into the formation of our solar system.

Dr. Lauretta's research interests are multifaceted, encompassing the formation of the solar system, the habitability of Earth, the origins of life, and the intricate connection between life and consciousness. His unwavering commitment to unraveling scientific mysteries has earned him a well-deserved reputation as a trailblazer in his field.

Beyond his scientific endeavors, Dr. Lauretta is a dedicated collaborator, mentor, and educator. He plays a pivotal role in shaping the future of cosmochemists and astrobiologists, providing guidance and inspiration to the next generation of scientists. He is the driving force behind the establishment of the Arizona Astrobiology Center, a testament to his commitment to fostering scientific excellence.

Program Session PL-10

PLENARY 10

PL-10

Does Physics need a revolution to understand life, living systems and consciousness? What can Quantum NanoBioPhysics Teach us here?

Anita Goel MD, PhD
Chairman, CEO & Scientific Director, Nanobiosym Research Institute Chairman & CEO, Nanobiosym Diagnostics, Inc, Boston, MA, USA

Primary Topic Area - TSC Taxonomy

[04.08].....Quantum brain biology

Categories by Discipline

4.0 Physical and Biological Sciences

Abstract

Keywords

Links to Research

https://www.nanobiosym.com/our-team/

https://sites.harvard.edu/goel/

Dr. Anita Goel, MD, Ph.D. is a world-renowned expert and global entrepreneur in the field of Nanobiophysics – an emerging science at the convergence of physics, nanotechnology, information science, and biomedicine. At the Nanobiosym Research Institute (NBS), Dr. Goel is pioneering the new physics of life, living systems, and consciousness. She and her team are elucidating the physics of one of the most fundamental processes of living matter, the way nanomachines read and write information into DNA, how this process is influenced by the environment, and how quantum mechanics might play a "nontrivial" role in their dynamics. Dr. Goel holds a Ph.D. and M.A. in Physics from Harvard University, an MD from the Harvard-MIT Joint Division of Health Sciences and Technology (HST) at Harvard Medical School, and a BS in Physics with Honors & Distinction from Stanford University.

Program Session PL-10

PLENARY 11

PL-11

Evidence for worldwide modulation of physical randomness correlated with coherent consciousness during New Year's Eve celebrations:

Dean Radin PhD
Institute of Noetic Sciences, Novota, California, USA

Primary Topic Area - TSC Taxonomy
[05.09].....Parapsychology

Categories by Discipline
4.0 Physical and Biological Sciences

Abstract
This study explored the hypothesis that during moments of collective human focus and emotional resonance unexpected coherence will emerge in random physical systems. This mind-matter interaction hypothesis was tested during New Years Eve celebrations in each time zone using data from the Global Consciousness Project, a worldwide network of electronic truly random number generators. Analyses of data spanning the years 1998 to 2025 —including simple measures like mean shifts as well

as changes in entropy, chaotic attractors, fractal dimensions, and Principal Components Analysis (PCA) —revealed statistically significant deviations at or within minutes of the stroke of midnight on New Years Eve, as compared to the same analysis applied to midnight transitions every other day of the year and to randomized permutation techniques (e.g., p = 4.8 × 10^-7 for the PCA analysis). The study also found that the statistical deviations were stronger in time zones with higher vs. lower populations, suggesting that the magnitude of this psychophysical interaction was related to the number of minds engaged in a coherent focus of attention. Alternative mundane explanations, including possible environmental artifacts, were considered but deemed unlikely because the RNGs were specifically designed to exclude such influences. An imaginative roundtable discussion among the founders of quantum mechanics is used as a vehicle to discuss these results.

Keywords

collective consciousness, mind-matter interaction, psychophysical phenomena, philosophical models

Links to Research

https://www.deanradin.com/recommended-references

Dean Radin is Chief Scientist at the Institute of Noetic Science (IONS), Associated Distinguished Professor at the California Institute of Integral Studies, and co-founder and chairman of the genetic neuroengineering company, Cognigenics, Inc. His early career track as a concert violinist shifted into science after earning a BS degree in electrical engineering (*magna cum laude*, with honors in physics) from the University of Massachusetts, Amherst, and an MS in electrical engineering and PhD in psychology from the University of Illinois, Urbana-Champaign. In 2022, he was awarded an honorary DSc (doctor of science) from the Swami Vivekananda University near Bangalore, India. For over four decades his research has focused on the nature and capacities of consciousness, primarily its nonlocal aspects. Before joining the IONS research staff in 2001, he worked at AT&T Bell Labs, Princeton University, University of Edinburgh, and SRI International, where he spent a year on the now declassified "Star Gate" program of psychic espionage for the US government.

Radin is author or coauthor of seven patents or patents pending in the area of neurogenetic medicine, one in mind-matter interaction, over 340 scientific, technical, and popular articles, book chapters, and best selling books including *The Conscious Universe*, *Entangled Minds* (2006), *Supernormal* (2013), *Real Magic* (2018), and *Enchantment* (coming in 2025).

His 170+ scientific articles can be found in peer-reviewed journals ranging from *Foundations of Physics* to *PLOS One, PNAS Nexus, Nature Translational Psychiatry, Genomic Psychiatry, Frontiers in Human Neuroscience, Psychological Bulletin, Brain and Cognition, and Psychology of Consciousness*. He serves as a referee for 25 journals, was featured in a *New York Times Magazine* article, and has appeared on dozens of television programs around the world. His 780+ interviews and talks have included presentations at Harvard (medical), Stanford (statistics), Princeton (psychology), Columbia (education), Cambridge (physics), Edinburgh (psychology), the Sorbonne (parapsychology), University of Padova (physics), University of British Columbia (parapsychology), Jawaharlal Nehru University (philosophy), and University of Allahabad (cognitive neuroscience).

Radin's invited talks for industries have included Merck, Google, Johnson & Johnson, and Rabobank, and his government talks have included the National Academy of Sciences, the Naval War College, Army Special Operations Command, Naval Postgraduate School, DARPA, the Indian Council of Philosophical Research (India), the International Center for Leadership and Governance (Malaysia), and the Australian Davos Connection (Australia).

Program Session PL-11

PLENARY 11

PL-11

Morphic Resonance and the Memory of Nature

Rupert Sheldrake PhD
Temenos Academy, London, United Kingdom

Primary Topic Area - TSC Taxonomy
[02.06].....Memory and learning

Categories by Discipline
4.0 Physical and Biological Sciences

Abstract
According the hypothesis of morphic resonance, memory is inherent in nature and the so-called laws of nature are more like habits. All self-organizing systems,

including crystals, living organisms, stars and galaxies are organized by morphic fields which contain an inherent memory, given by a process called morphic resonance from previous similar systems. All species have a collective memory, on which each individual draws and to which it contributes. Self-organizing systems are sustained by self-resonance from their own past, and even individual memory depends on morphic resonance rather than on physical memory traces stored within the brain. The hypothesis has many implications for information and consciousness in the universe.

Keywords

Morphic Resonance, memory, memory traces, collective memory

Links to Research

R. Sheldrake (2011) *A New Science of Life*. Icon Books, London

Rupert Sheldrake PhD is a biologist and author of more than 100 papers in peer-reviewed journals and nine books, including *The Presence of the Past*. He was a fellow of Clare College, Cambridge, where he was director of studies in cell biology, and also a research fellow of the Royal Society. From 2005-2010, he was Director of the Perrott-Warrick Project for the study of unexplained human and animal abilities, funded from Trinity College, Cambridge. He is currently a fellow of the Institute of Noetic Sciences in California and of the Temenos Academy in London. He lives in London and is married to Jill Purce. His web site is www.sheldrake.org

Program Session. PL-11

PLENARY 12

PL-12

New clues to Terminal Lucidity in mentally-impaired adults: Exploring permissive vs. productive hypotheses for brain function

Marjorie Woollacott PhD

University of Oregon, Eugene, Oregon, USA

Primary Topic Area - TSC Taxonomy

[05.08].....Near-death and anomalous experiences

Categories by Discipline

3.0 Cognitive Science and Psychology

Abstract

To penetrate the mysteries of the nature of consciousness, it is vitally important to expand our understanding of death-related phenomena. One of these, Terminal lucidity (TL), the unexpected surge of mental clarity shortly before death in a dying person, has been typically studied in cases of advanced dementia. The nature and contributing factors to TL are poorly understood, as it often occurs in individuals whose neurological decline is believed to be irreversible. For example, patients have been reported to experience sudden enhanced thinking and mobility, to access lost memories and to recognise and converse with friends and family, and often to say goodbye. Previous studies have largely involved individual clinical cases (Nahm & Greyson, 2009; Nahm et al., 2012). Though valuable, these cases have not been systematically collected and thus may not include key phenomena contributing to identification of possible mechanisms. This study explored this phenomenon further, identifying and describing psychological and physiological variables witnessed in TL in a medically diverse sample of adults across the lifespan to begin to identify factors contributing to TL. We created an online questionnaire which captured a range of significant details about subjects who had experienced a TL episode, including underlying medical condition, treatment regimen (and recent changes), physical and mental capacities just before the TL episode, and behaviors that occurred during the episode itself. We have received 69 responses to the survey, 38 of which met our rigorous criteria for inclusion as TL. Preliminary results: Medical condition prior to the TL episode included dementia/Alzheimer's, various cancer diagnoses, stroke, and other end-of-life conditions. The most frequent duration of TL in this sample lasted 10 minutes or less and roughly half of the patients died within 24 hours after TL. When clinical staff or caregivers were asked if changes in the patient's condition or medication/treatment prior to their terminal lucidity episode could have been responsible for the TL experience, 32 of 38 said this was not the case (3 unsure, 3 yes). And in 27 of 38 cases, the witness reported a shift from severe cognitive impairment (including nonresponsive/coma) prior to TL, to little or no cognitive impairment during TL. When asked if the person had lost physical abilities, but regained them during the episode, 28/38 witnesses confirmed that this was the case. Example: "The lady had been unresponsive for days and was in the terminal phase of life. I came in expecting that she had died overnight and found her sitting up eating breakfast- chatting with her family. I explained to the family that her bright condition may not last - and she died that night." Our findings suggest that a specific medical diagnosis or physical condition did not appear to account for the arising of TL or the characteristics of the TL episode, and offer possible support for the hypothesis that the brain is a permissive organ rather than a productive one. Project Team members

include: M.Woollacott, N.Tassell-Matamua, K.Kothe, C.Roe, M.Nahm, B.Greyson, M.Mutis, R.Evrard, A.Gomez-Marin, and A.Kellehear.

Keywords

terminal lucidity, consciousness, dementia, dying, Alzheimers

Links to Research

Roehrs, P, Fenwick, P, Greyson, B, Kellehear, A, Kothe, K, Nahm, M, Roe, C, Tassell-Matamua, N, PhD, Woollacott, M**.** Terminal Lucidity in a Pediatric Oncology Clinic, *J. Nervous and Mental Disease,* 2024 Jan 1;212(1):57-60. doi: 10.1097/NMD.0000000000001711. Epub 2023 Sep 13.PMID: 37734159.

Woollacott, M. Near Death Experience: Memory recovery during hypnosis. Explore (NY). 2024 Nov-Dec;20(6):103036. doi: 10.1016/j.explore.2024.103036. Epub 2024 Jul 24.PMID: 39096700

Marjorie Woollacott, Ph.D., is Professor in the Institute of Neuroscience and prior chair of the Dept. of Human Physiology at the University of Oregon. She taught courses in neuroscience and rehabilitation medicine, as well as complementary medicine and meditation. She is President of the Academy for the Advancement of Post-Materialist Sciences (AAPS) and Research Director for the International Association of Near-Death Studies (IANDS). Woollacott has received over 7.2 million dollars in research funding for her research in child development, rehabilitation medicine and most recently, meditation, spiritual awakening and end-of-life experiences. She has published more than 200 scientific articles and written or co-edited nine books. Her latest book, *Infinite Awareness* (2015) (winner of eight awards, including the 2017 Parapsychological Association Book Award, Eric Hoffer Book Award and the Nautilus Book Award) pairs Woollacott's research as a neuroscientist with her self-revelations about the mind's spiritual power. She has been a popular key-note speaker at international conferences, including the *Beyond the Brain Conference* of the Scientific and Medical Network in London, and the International Association for Near-Death Studies (IANDS) conference in the United States. She has also been featured in the documentary *Who We Are* and in many podcasts, including *Beyond Belief*, in the episode titled, "You Are not Your Brain" (link: https://www.audacy.com/podcast/beyond-belief-ad0f9/episodes/you-are-not-your-brain-0e543), the *New Thinking Allowed* podcast with Jeffrey Mishlove, speaking on "The Mind Brain Interface" (link: https://www.audacy.com/podcast/beyond-belief-ad0f9/episodes/you-are-not-your-brain-0e543), and *The Essential Foundation* podcast, speaking on "Consciousness without Neurons" https://www.youtube.com/watch?v=YvoT_05JgbE

Program Session PL-12

PL-12

If consciousness survives, materialism dies: re-appraising the “permissive brain” hypothesis at the edges of consciousness

Prof. Alex Gomez-Marin PhD
Instituto de Neurociencias, Alicante, Alicante, Spain

Primary Topic Area - TSC Taxonomy

[02.04].....Other sensory modalities

Categories by Discipline

2.0 Neuroscience

Abstract

What happens with the mind when the brain dies? This question can be scientifically approached in a two-fold manner. First, the study of end-of-life brain activity can shed light on how our brains function under extreme conditions. The topic would thus lie within what Thomas Kuhn called “normal science”, namely, solving puzzles circumscribed to the boundaries of the dominant paradigm. Second, seriously entertaining the possibility that there can be mind activity when the brain is literally dead ventures our quest into the realm of “scientific revolutions”. To put it plainly: if consciousness survives bodily death, materialism dies. I will explore this possibility from three sources: my own near-death experience in March of 2021, my training as a PhD in theoretical physics, and my career as a neuroscientist. Bringing the visionary insights of William James back to the future, I will revisit the “productive versus permissive” brain hypotheses and contrast them in the context of empirical data at the edges of consciousness. I will start with converging evidence within Survival research, then move into Psychical research (one does not need to almost die to experience or investigate minds beyond brains), and finally dare to speculate about the connection of these two fields with the renewed interest in Unidentified Anomalous Phenomena (good old-fashioned UFOs) and the prospects of Artificial Consciousness (and the dangerous bullshit around it). The singularity is near, but it is probably not what you think.

Keywords

near-death experience, permissive brain, end of materialism, anomalous phenomena; theoretical physics

Àlex Gómez-Marín is a theoretical physicist and neuroscientist. He earned his bachelor's and PhD degrees in physics at the University of Barcelona. He later worked as a postdoctoral researcher at the EMBL-CRG Centre for Genomic Regulation and at the Champalimaud Centre for the Unknown in Lisbon. Since 2016, he has been a principal investigator at the Institute of Neurosciences in Alicante. He is currently an associate professor at the Spanish National Research Council (CSIC) and the director of the Pari Center in Tuscany, Italy, a center dedicated to exploring the intersection of science, art, and the sacred. His research focuses on studying the human mind in the real world, including what he calls "the edges of consciousness," a strange and wonderful field where enigma often meets stigma. Program Session PL-12

PL-12

Potential neural signatures of near-death consciousness in humans

Jimo Borjigin PhD, Gang Xu PhD
University of Michigan, Ann Arbor, MI, USA

Primary Topic Area - TSC Taxonomy
[02.01].....Neural correlates of consciousness (general)

Categories by Discipline
2.0 Neuroscience

Abstract
The brain is assumed to be hypoactive during cardiac arrest. However, animal models of cardiac and respiratory arrest demonstrate a surge of gamma oscillations and functional connectivity. To investigate whether these preclinical findings translate to humans, we analyzed electroencephalogram and electrocardiogram signals in four comatose dying patients before and after the withdrawal of ventilatory support. Two of the four patients exhibited a rapid and marked surge of gamma power, surge of cross-frequency coupling of gamma waves with slower

oscillations and increased interhemispheric functional and directed connectivity in gamma bands. High-frequency oscillations paralleled the activation of beta/gamma cross-frequency coupling within the somatosensory cortices. Importantly, both patients displayed surges of functional and directed connectivity at multiple frequency bands within the posterior cortical “hot zone,” a region postulated to be critical for conscious processing. This gamma activity was stimulated by global hypoxia and surged further as cardiac conditions deteriorated in the dying patients. These data demonstrate that the surge of gamma power and connectivity observed in animal models of cardiac arrest can be observed in select patients during the process of dying. They also suggest the existence of neural correlates of near-death consciousness underlying near-death experiences reported by survivals of cardiac arrest.

Keywords

near-death, consciousness, brain, EEG, near-death experience

Links to Research

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Submit short paragraph bio

Jimo Borjigin is an Associate Professor of Physiology and Neurology at the University of Michigan Medical School. She received her BS in Physics, MS in Biophysics from Tohoku University in Sendai, Japan, and PhD in Neuroscience from the Johns Hopkins University in Baltimore, USA. After conducting her postdoctoral training at the Hopkins, she was invited to become a staff associate at the Carnegie Institution of Washington Embryology Department. In 2003, she moved to the University of Michigan as an Assistant Professor, focused her research initially on the use of melatonin as an in vivo tool to understand circadian rhythms; and since 2013, on the neural correlates of consciousness in the dying brain.

Program Session P-12

PL-13

Investigating the Psionic Interface: Alleged Non-Human Interactions with Human Consciousness in Covert UAP Programs.

Ross Coulthart
News Nation TV investigative journalist and author of In Plain Sight: An Investigation into UFOs & Impossible Science, Australia

Primary Topic Area - TSC Taxonomy

[04.22].....Miscellaneous

Categories by Discipline

4.0 Physical and Biological Sciences

Abstract

For nearly four decades, Ross Coulthart, a veteran investigative journalist and former host of Australia's 60 Minutes, has pursued confronting stories within the world of covert intelligence programs and defense. Since joining News Nation, a Chicago based cable news network, Coulthart has exclusively revealed whistleblower allegations from US intelligence and defense insiders asserting a covert government cover-up of non-human intelligence (NHI) engaging with Earth. Drawing from his 2023 expose of USAF officer David Grusch's claims of secret UAP retrievals and his January 2025 interview with former intelligence operative Jack Barber, Coulthart presents evidence of an alleged secret US 'legacy UAP retrieval and reverse engineering program' involving psionic phenomena – psychic interactions between humans and NHI technology and/or entities. Barber, a trained USAF special operations combat controller turned undercover intelligence operative, alleges direct involvement in retrieving non-human craft, including an 'egg-shaped' object, for a private aerospace contractor in collaboration with the US Government. Central to his claims is the assertion that these craft, or perhaps entities within them, exhibit psionic properties, interfacing with human consciousness. Barber reports he and his colleagues involved in these retrievals have experienced intrusive clarity, foreign thoughts and images flooding their minds – suggesting the NHI employ psionic technology as a control or defense mechanism. He further alleges that the Pentagon's All-domain Anomaly Resolution Office, which investigates UAPs, was briefed on these interactions, despite its public denial of extraterrestrial engagement. Corroborated by his special operations colleagues, Barber claims individuals with heightened psychic, intuitive or empathic abilities – recruited through programs like the Gifted and Talented initiative in public schools – play a critical role in connecting with NHI craft, potentially enabling their retrieval and operation. Coulthart's investigation uncovers a historical thread linking these allegations to Cold War-era

US research into psychic phenomena, including the CIA's declassified remote viewing programs, which he argues have evolved into a modern psionic initiative. While the US Department of Defense (DoD) has not challenged Barber's specific claims – stating only that AARO is investigating – their broader denial of extraterrestrial evidence contrasts with leaked documents like 'Slide 9' from the Advanced Aerospace Threat Identification Program (AATIP). This briefing slide, presented to a DoD deputy secretary, warned of NHI capabilities to manipulate human perception and cognition, framing such phenomena as emerging quantum physics. This presentation will explore the implications of Barber's allegations for consciousness studies, integrating firsthand accounts, whistleblower testimony and historical context. Coulthart will recount his experience of witnessing a psionic 'summoning' by a member of Barber's SKYWATCHER team, a private initiative aimed at replicating the secret Government program by retrieving NHI craft. While constrained by ethical secrecy obligations to his extensive sources within the legacy program, and acknowledging the absence to date of public physical evidence, Coulthart argues that these claims warrant rigorous scientific inquiry and public congressional oversight. Attendees will be invited to consider how alleged NHI interactions with human consciousness challenge current paradigms, bridging investigative journalism with the frontiers of cognitive science. **Program Session PL-13**

PL-13

How do non-human intelligences communicate with humans?

Brannon Wheeler

U.S. Naval Academy, Annapolis, MD, USA

Primary Topic Area - TSC Taxonomy

[05.05].....Transpersonal and humanistic psychology

Categories by Discipline

3.0 Cognitive Science and Psychology

Abstract

How do non-human intelligences communicate with humans? For millennia, people have wondered about the stars and the gods--how and why do they intervene in our affairs? In the Middle Ages, great scholars (Maimonides, Aquinas, Suyuti, Buddhaghosa) and mystics (Luria, Eckhart, Avicenna, Ibn Arabi) devoted their lives to studying the mechanisms of revelation and human experience of the divine. Yet the

bulk of this incredibly rich and varied work has not been applied to examining contemporary experiences of contact with non-human intelligence, nor have the first-hand knowledge of contactees been utilized adequately to help understand "religious" encounters with divine beings. My research proposes that these two perspectives on human encounters with non-human consciousness be brought together, that contactee experiences be put on equal footing with other historical examples of NHI-human interaction, to provide a more balanced and broader generic study of how NHI communicate with humans. This study proceeds by collecting examples of reported human-NHI communication, both verbal (in the traditional sense of the transmission of an articulated message through speech or otherwise) and non-verbal (physical manipulation of objects including bodies). A comparison of a range of examples--drawn from "religious" and contactee reports--can suggest some general theoretical conclusions about potential mechanisms underlying the experiences themselves and the way they are conceptualized.

Brannon Wheeler is a historian of religion, a professor in the history department at the United States Naval Academy in Annapolis. He has published eleven books and numerous articles mostly focused on how and to what effect NHI communicate with humans and intervene in history--prophets, scripture, exegesis, and more recently how this overlaps with consciousness and UAP related experiences. He teaches courses on mystery religions, Bible, UFO mythology, truth, consciousness, and NHI encounters. He has held visiting positions throughout Europe (Oxford, Bergen, Paris, London) and the Middle East including the Hebrew University in Jerusalem, the King Fahd Center for Research and Islamic Studies in Riyadh, and several American research study centers in Amman, Tunis, Kuwait, Beirut, and Cairo. **Program Session PL-13**

PL-14

Physics of Spacetime from Traces of Consciousness

Donald D Hoffman PhD
University of California, Irvine, California, USA

Primary Topic Area - TSC Taxonomy
[01.04].....Ontology of consciousness

Categories by Discipline

4.0 Physical and Biological Sciences

Abstract

Quantum field theory and general relativity each assume that spacetime is fundamental. Together, however, they entail that spacetime is not fundamental: it has no operational meaning beyond the Planck scale. Spacetime and its objects are useful constructs, but must emerge from something deeper. High-energy theoretical physicists, funded in part by the UNIVERSE+ project of the ERC, are exploring new "positive geometries" beyond spacetime, such as amplituhedra, associahedra, cosmohedra, and surfaceology. Evolution by natural selection agrees that spacetime and its objects are not fundamental. Sensory systems evolve to be useful but not true. Each sense acts as a user interface—a virtual reality—that hides fundamental reality and guides adaptive action. The senses do not present, or represent, fundamental reality. The language of the senses, including physical objects with their causal or functional properties, is a useful fiction. Theories of conscious experiences that assume otherwise, claiming that experiences emerge from causal or functional properties of neurons or other objects, fail to explain even one experience, such as the taste of mint. The failure is principled. For instance, what specific n x n transition probability matrix, encoding a causal structure, must be the taste of mint or the experience of space? Why must the n^2 elements of the matrix have their specific values? I present a theory of "conscious agents" beyond spacetime, based on a Markovian dynamics. I discuss a new partial order on Markov chains, the "trace order," in which one Markov chain entails another iff it is a trace chain of the other. I use the trace order to propose a theory of observation and of beliefs induced by observation. I show how the trace order encodes time dilations and length contractions, analogous to those of special relativity. I propose a many-to-one mapping from properties of the dynamics of conscious agents to physical properties of mass, spin, energy, and momentum. The goal is to construct a map from the dynamics of conscious agents onto the positive geometries discovered by physicists, and thence into spacetime and physical objects, such as neurons and brains. It is not possible to boot up conscious experiences from objects and properties in spacetime. It is, however, possible to boot up spacetime and its objects from conscious experiences.

Keywords

Hard Problem, Markov Matrix, Physicalism, Panpsychism, Idealism, Natural Selection, Quantum Theory, Positive Geometries

Links to Research

https://www.mdpi.com/1099-4300/22/5/514

https://www.mdpi.com/1099-4300/25/1/129

https://www.ingentaconnect.com/content/imp/jcs/2024/00000031/f0020009/art00003;jsessionid=1mfffup1ilng9.x-ic-live-02

Donald Hoffman received his PhD from MIT, and joined the faculty of the University of California, Irvine in 1983, where he is a Professor Emeritus of Cognitive Sciences. He is an author of over 100 scientific papers and three books, including *Visual Intelligence* and *The Case Against Reality*. He received a Distinguished Scientific Award of the American Psychological Association for early career research, the Rustum Roy Award of the Chopra Foundation, and the Troland Research Award of the US National Academy of Sciences. His writing has appeared in *Edge*, *New Scientist*, *LA Review of Books*, and *Scientific American* and his work has been featured in *Wired*, *Quanta*, *The Atlantic*, and *Through the Wormhole with Morgan Freeman*. He has a TED Talk titled "Do we see reality as it is?" and a podcast with Lex Fridman titled "Reality is an illusion."

Program Session PL-14

PL-14 Consciousness is the Ontological Primitive of the Universe

Deepak Chopra MD, FACP, FRCP
Cyberhuman.ai, New York, NY, USA

Primary Topic Area - TSC Taxonomy

[01.01].....The concept of consciousness

Categories by Discipline

1.0 Philosophy

Abstract

Consciousness is not a byproduct of the physical brain but the fundamental ground of existence from which space, time, matter, and energy arise. Rather than being confined to individual minds, consciousness is a non-local field of infinite potential, shaping and perceiving reality simultaneously. The universe, as we experience it, is not external to us but unfolds within this awareness. In this view, the boundaries between observer and observed, thinker and thought, dissolve into a unified field of being, aligning with both ancient Vedic wisdom and insights from quantum

mechanics, where entanglement and superposition challenge conventional materialist paradigms. This perspective invites a radical shift in how we understand selfhood, perception, and the nature of reality itself. By embracing consciousness as the foundation of existence, we move beyond fragmentation toward wholeness, recognizing that we are not separate entities in a mechanistic universe but the creators and experiences of all that is. This presentation will explore the implications of consciousness as the primary reality, bridging Eastern metaphysical traditions with contemporary scientific discourse.

Deepak Chopra, MD, FACP, FRCP, is a physician and author of over 95 books onIntegrative Well-Being and Spiritual Intelligence. Founder of Cyberhuman.ai and DeepakChopra.ai

DEEPAK CHOPRA MD, FACP, FRCP, is a physician and the leading authority on IntegrativeWell-Being and Spiritual Intelligence, Founder of Cyberhuman.ai and DeepakChopra.ai. Chopra is a Clinical Professor of Family Medicine and Public Health at the University of California, San Diego, and serves as a senior scientist with Gallup Organization. He is also an Honorary Fellow in Medicine at the Royal College of Physicians and Surgeons of Glasgow. He is the author of over 95 books, translated into over forty-three languages, including numerous New York Times bestsellers. For the last thirty years, Chopra has been at the forefront of the meditation revolution. His mission is to create a more balanced, peaceful, joyful and healthier world. Through his teachings, he guides individuals to embrace their inherent strength, wisdom, and potential for personal and societal transformation. In his next book, *Awakening: The Path to Freedom and Enlightenment* (Harmony/Rodale, 01/06/25), Chopra offers the power to free you from the limitations of ego into a life marked by inner and outer peace, purpose, and boundless possibility. TIME magazine has described Dr. Chopra as “one of their top 100 most influential people.”
www.deepakchopra.com **Program Session PL-14**

PLENARY 14 PL-14

Consciousness and Free Will are Quantum Properties of Being

Dr Federico Faggin PhD
Federico and Elvia Faggin Foundation, Los Altos Hills, CA, USA

Primary Topic Area - TSC Taxonomy

[01.04].....Ontology of consciousness

Categories by Discipline

1.0 Philosophy

Abstract

Free will without consciousness cannot exist. Consciousness without free will has no causal power and is therefore impotent. We cannot explain consciousness and free will with mathematics (mathematics is created by consciousness) or with something that does not have those properties to begin with. Consequently, we must postulate the existence of consciousness and free will from the origin of the universe. If we do that, the quantum fields must be conscious and have free will, and we can then explain why quantum field theory must have the baffling properties (superposition, entanglement, and quantum state collapse) that have puzzled scientists for the last 100 years. This convincing explanation confirms the soundness of the postulate. And if we start from this postulate, the nature of reality is completely different from what we believe now!

Keywords

Consciousness, free will, quantum fields, nature of reality

Federico Faggin is a physicist born and educated in Italy who co-invented and developed the MOS Silicon Gate Technology at Fairchild Semiconductor and designed the world's first microprocessors at Intel. Faggin also co-founded and led Zilog and Synaptics, two successful high-tech companies, before founding the non-profit Federico and Elvia Faggin Foundation, dedicated to the science of consciousness. He received the 2009 National Medal of Technology and Innovation from President Barack Obama and was knighted in 2019 by the President of Italy, Sergio Mattarella.

Program Session PL-14